

AS (E) Sub 2 41. The method of claim 4, wherein the method further comprises pre-filtering the beer before performing step (a) of the method.

42. The method of claim 41, wherein the beer is pre-filtered through Diatomaceous earth or a combination of Diatomaceous earth and deep-bed filtration.

REMARKS

The present application is the U.S. national phase of a PCT application. The claims and specification of the PCT application were amended during the Chapter 2 phase before the International Patent Examining Authority. Specifically, substitute pages 9, 11-13, 15, 16, 18, and 29, which revised the specification and claims, were submitted. In the present Amendment, originally filed claims 6, 19, and 23 are canceled, and claims 36-42 are added. For the Examiner's convenience, applicants have attached a copy of the pending claims (as amended) hereto.

The pending claims which are not cancelled by this Amendment have been amended merely to conform the claims to U.S. patent practice (e.g., by eliminating multiple dependent claims which were dependent on other multiple dependent claims) or to more clearly and particularly describe the invention (e.g., replacement of "said" with "the" elimination of passive voice, etc.). The cancellation of claims 6, 19, and 23 is likewise intended merely to avoid redundancy in the previously filed claims or to organize previously multiply dependent claims in a more coherent fashion. Thus, the present amendment of the claims should in no way be regarded as a surrender of subject matter or scope of the claimed invention, or as otherwise limiting the claims set forth herein.

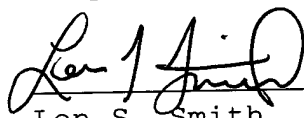
The addition of new claims 36-42 is supported by the specification in its entirety and claims 1-35 as originally filed. Examples of support for claim 36 can be found on page

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5, lines 11-17 and 21-27, as well as page 6, lines 4-12 of the specification. Examples of support for claims 37-40 can be found at page 6, lines 13-30. Examples of support for claims 41 and 42 can be found at page 9, lines 8-13.

In view of the above, the amended claims and the newly added claims are supported by the specification and do not represent new matter. Furthermore, the application is considered to be in good and proper form for allowance and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the instant application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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PATENT

Attorney Docket No. 202531

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Pelz et al.

Group Art Unit: Unassigned

U.S. National Phase of:
PCT/US98/06969

Examiner: Unassigned

International Filing Date:
April 7, 1998

For: METHOD FOR PRODUCING BEER

PENDING CLAIMS AS OF OCTOBER 8, 1999

1. A method of filtering beer comprising:
 - (a) filtering beer through a porous membrane until such time that the porous membrane is in need of cleaning,
 - (b) contacting the porous membrane with an enzyme selected from the group consisting of cellulases, amylases, and combinations thereof in the absence of a protease or a glucanase to clean the porous membrane, and
 - (c) then reusing the porous membrane to continue filtering beer.
2. The method of claim 1, wherein the porous membrane is not contacted with an enzyme other than the cellulase or the amylase.
3. The method of claim 1, wherein the porous membrane is contacted with the cellulase.

4. A method of filtering beer comprising:
 (a) filtering beer through a porous membrane until such time that said porous membrane is in need of cleaning,
 (b) contacting the porous membrane with a cellulase having a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 0.1 to clean the porous membrane, and
 (c) then reusing the porous membrane to continue filtering beer.

5. The method of claim 4, wherein the porous membrane is contacted with the cellulase and is not contacted with any other enzyme.

7. The method of claim 4, wherein the cellulase has a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 0.3.

8. The method of claim 7, wherein the cellulase has a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 0.4.

9. The method of claim 8, wherein the cellulase has a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 0.5.

10. The method of claim 9, wherein the cellulase has a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 1.

11. The method of claim 10, wherein the cellulase has a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 1.2.

12. The method of claim 4, wherein the cellulase is derived from *Trichoderma*.

13. The method of claim 12, wherein the *Trichoderma* is *Trichoderma reesei* or *Trichoderma longibrachiatum*.

14. The method of claim 4, wherein the cellulase is derived from *Thermomonospora*.

15. The method of claim 14, wherein the *Thermomonospora* is *Thermomonospora fusca*.

16. The method of claim 4, wherein the porous membrane is contacted with the amylase.

17. The method of claim 16, wherein the amylase is selected from the group consisting of α -amylase, β -amylase, and the combination thereof.

18. The method of claim 4, wherein the method further comprises contacting the porous membrane with an aqueous base prior to reusing the porous membrane.

20. The method of claim 18, wherein the aqueous base is an aqueous solution of NaOH and/or KOH.

21. The method of claim 18, wherein the base is present in a concentration of 0.1-1 N in the aqueous base.

22. The method of claim 18, wherein the porous membrane is contacted with the aqueous base at a temperature of 40-90 °C.

24. The method of claim 4, wherein the porous membrane is contacted with α -amylase at a temperature of 60-75 °C and a pH of 4.6-5.8.

25. The method of claim 4, wherein the porous membrane is contacted with β -amylase at a temperature of 40-60 °C and a pH of 4.6-5.8.

26. The method of claim 4, wherein the porous membrane is cleaned until the zeta potential of the porous membrane ceases to change.

27. The method of claim 4, wherein the time that the porous membrane is in need of cleaning is determined by the pressure drop across the porous membrane.

28. The method of any of claim 4, wherein the method further comprises determining the time that the porous membrane is in need of cleaning by determining the streaming potential or zeta potential of the porous membrane.

29. A method of filtering beer comprising:

(a) filtering beer through a porous membrane that progressively clogs during filtration,

(b) monitoring the streaming potential or zeta potential of the porous membrane as a measure of the extent of clogging of the porous membrane,

(c) halting filtration of the beer through the porous membrane before the porous membrane becomes fully clogged as determined by the streaming potential or zeta potential of the porous membrane,

(d) cleaning the porous membrane, and

(e) then reusing the porous membrane to continue filtering beer.

30. The method of claim 28, wherein the filtration is halted when the streaming potential or zeta potential of the porous membrane is reduced to 20% of its original value for the unused porous membrane.

31. The method of claim 4, wherein the porous membrane is a polyamide porous membrane.

32. The method of claim 31, wherein the filtration is halted when the zeta potential of the porous membrane exceeds -5 mV as measured at pH 4.2.

33. The method of claim 4, wherein the filtering of the beer is cold-filtering of the beer.

34. A filtration unit for filtering beer comprising a feeder line for the filtration-bound beer, a porous membrane, a run-off line for the filtered beer, and means for monitoring the streaming potential and/or zeta potential of the porous membrane through which beer flows.

35. The filtration unit of claim 34, further comprising a bypass porous membrane through which beer flows, wherein the monitoring means for monitoring the streaming potential and/or zeta potential does so with respect to the bypass porous membrane.

36. The method of claim 29, wherein performing step (d) of the method comprises performing contacting the porous membrane with a cellulase having a crystalline:soluble cellulase activity ratio at 60 minutes of at least about 0.1 to clean the porous membrane.

37. The method of claim 4, wherein the porous membrane is a nylon-6, 6 membrane.

38. The method of claim 4, wherein the porous membrane has a pore rating of about 0.02-1 μm .

39. The method of claim 38, wherein the porous membrane has a pore rating of about 0.1-1 μm

40. The method of claim 39 wherein the porous membrane has a pore rating of about 0.45 μm .

41. The method of claim 4, wherein the method further comprises pre-filtering the beer before performing step (a) of the method.

42. The method of claim 41, wherein pre-filtering the beer comprises use of Diatomaceous earth or a combination of Diatomaceous earth and deep-bed filtration to pre-filter the beer.

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